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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/810,195	03/25/2004	Michael P. Galligan	4339/4358I (CON)	9678

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EXAMINER	
NGUYEN, NGOC YEN M	
ART UNIT	**PAPER NUMBER**
1754	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/810,195	GALLIGAN ET AL.	
	Examiner	Art Unit	
	Ngoc-Yen M. Nguyen	1754	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 March 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-11,20,21,36-39 and 46* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2-11,20,21,36-39 and 46* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

The disclosure is objected to because of the following informalities: on page 16, lines 4-26, as amended, it is disclosed that "A visual comparison of Figures 1A through 1D and a roughened surface that results from electric arc spraying an anchor layer onto a substrate is taught therein", however, it is unclear the "*visual* comparison" is made between the Figures 1A through 1D and which figure(s).

Appropriate correction is required.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 8-11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 8, it is unclear if "an internal combustion engine" is additionally required beside "an engine" of the independent claim 36.

In claim 9, there is no antecedent basis for "the metal substrate"; also, it is unclear if "an internal combustion engine" as required in claim 9 is the same as the internal combustion engine of claim 8 or the engine of claim 36.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2-5, 7-11, 21, 36-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gorynin et al (5,204,302) in view of in view of Rondeau (4,027,367), optionally further in view of Ishida (4,455,281).

Gorynin '302 invention relates to a multi-layered catalyst on a metal substrate for the catalytic conversion of gases, such as purification of exhaust gases of internal combustion engines (note column 1, lines 6-10).

Gorynin '302 further discloses in the Example that a catalyst of NiAl sublayer, a catalytically active layer and a porous layer was assembled by corrugating a catalyst strip and rolling it into a cylinder. A standard feed gas was introduced into a chamber containing the catalyst (note paragraph bridging columns 9-10).

It would have been obvious to one skilled in the art to use the process as disclosed in Gorynin '302 to treat exhaust gas from any known internal combustion engine, including engines such as motorcycle, lawn mower.

Gorynin '302 discloses a catalyst comprising a metallic substrate; an adhesive sublayer diffusion bonded onto said substrate; and a catalytically active layer deposited on said sublayer and a porous layer deposited on said catalytically active layer (note claim 1). The adhesive sublayer is prepared from thermally reactive powders, such as those prepared from nickel and titanium, aluminum with at least one or more of Co, Cr, Mo, Ta, Nb, Ti or Ni or silicon with at least one or more of Ti, Nb, Cr, W, Co, Mo, Ni or

Ta (note column 2, lines 25-35). For the composition of the Ni alloy used, it would have been obvious to one of ordinary skill in the art to optimize such composition to obtain the best adhesive layer.

The adhesive layer in Gorynin is formed by plasma spraying. The thermally reactive powders are introduced into a plasma torch and an exothermic reaction is initiated in the torch. The exothermic powders impinge the substrate where the reaction continues. The heat generated in the reaction causes diffusion of the sub-layer into the substrate resulting in a diffusion bond and strong adhesion of the sublayer to the substrate (note column 3, lines 6-15). Thus, Gorynin '302 fairly teaches that the plasma spraying process is used to obtain a diffusion layer which improves the bonding between the two layers.

The difference is Gorynin '302 does not disclose the use of electric arc to form the adhesive layer.

Rondeau '367 discloses a method of thermal spraying a substrate to deposit a self-bonding coating on such substrate, comprising supplying an electric arc thermal spray gun with a wire feed comprising an alloy of nickel and aluminum or titanium, and using such electric arc thermal spray gun, spraying said wire feed onto such substrate to coat the same thereby to establish diffusion bond between such coating and such substrate to provide a self-bonding coating on such substrate (note claim 1). Rondeau '367 discloses that several types of thermal spraying guns are available including combustion flame spray guns, e.g., the oxy-fuel gas type, plasma arc spray guns and electric arc spray guns. Combustion flame spray guns require a source of fuel, such as

acetylene, and oxygen and the temperature produced therein are usually relatively low and often incapable of spraying materials having melting points exceeding 5,000°F. Plasma arc spray guns are usually the most expensive type and they produce much higher temperatures than the combustion type, e.g. up to approximately 30,000°F. Furthermore, plasma arc spray gun require a source of inert gas, such as argon, for creation of the plasma, and the gas flow rate and electric power therefor require extremely accurate control for proper operation. On the other hand an electric arc spray gun simply requires a source of electric power and a supply of compressed air or other gas, as is well known, to atomize and to propel the melted material in the arc to the substrate or target (note column 1, lines 25-43).

In undertaking the method of Rondeau '367 a number of important advantages are realized over the prior art. Firstly, the process uses an electric arc spray gun, which is more economically operated than other thermal spray equipment. Second, the material to be sprayed is supplied as a wire, which is more convenient to use than powder. The wire may be thin strand all the way up to a relatively thick rod as long as it is suitable for spraying through an electric arc spray gun. Third, the wire is readily formed as an alloy of the two primary materials nickel and aluminum or nickel and titanium. Fourth, the cohesive, adhesive and hardness attributes of the coating on an article formed by the method of the invention are generally equivalent to or better than corresponding attributes for a coating on an article sprayed with powder using other thermal spray devices (note paragraph bridging columns 2-3).

Rondeau '367 can be further applied to teach that the wire alloy comprises a minimum of 93% nickel, from 4 to 5.2% aluminum, from 0.25 to 1.00% Ti (note column 4, lines 15-20).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to use electric arc spraying method, instead of plasma spraying, to form the adhesive layer in Gorynin '302, as suggested by Rondeau '367 because electric arc spraying method can form the same diffusion bond between the two layers but it would cost less plus the additional advantages as stated above.

Optionally, Ishida '281 can be applied to teach that it is known in the art to form an adhesive layer on a substrate of a catalyst by using electric arc spraying process before depositing the catalytic layer in order to form a catalyst that is highly resistant to peel off (i.e. better bonding) (note column 7, lines 62-67).

Claims 2-11, 20-21, 36-39, 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gorynin '302 in view of Rondeau '367 and Ernest et al (4,451,441), optionally further in view of Ishida '281.

Gorynin '302, Rondeau '367 are applied as stated above.

Ishida '281 can be optionally applied as stated above.

The difference not yet discussed is Gorynin '302 does not disclose a substrate with at least two regions of different substrate densities.

Ernest '441 discloses a method for removing carbon and lead particles from internal combustion engine exhaust gases by passing the gases through a coarse filter

and then through a fine filter (note column 1, lines 29-45). The filters may comprise any material which is effective for trapping the particles in the gases (note column 1, lines 62-66). Preferably, the filters are unitary structures of relatively large size such as ceramic monoliths, metal wools, or metal meshes (note column 2, lines 10-21). Ernest '441 further discloses that a catalyst material may be deposited on the filters and when used in the treatment of internal combustion engine exhaust gases, the catalyst material is preferably also effective for the conversion of hydrocarbons, carbon monoxide and/or nitrogen oxide pollutants. Such catalyst materials include a noble metal, an element of the first transition series, and mixtures thereof. The noble metals are gold, silver and the platinum group metals (note column 3, lines 37 and 56-66) with platinum group metal being preferred (note paragraph bridging columns 3-4). For the amount of catalytic material on the filters, Ernest '441 fairly teaches, in the examples, that the loading of platinum and palladium in the coarse filter is different than that of the fine filter (note Table II). Table II also teaches that the same catalytic material is used for both filters.

Ernest '441 can further be applied to teach that the filters, i.e. substrates, can be ceramic monoliths, metal wools or metal meshes. An open cell filter structure having a plurality of interconnected voids is especially preferred (note column 2, lines 15). Also, Ernest '441 teaches that if a surface area higher than that of the filter is desired, the catalyst material may be supported on a porous, refractory inorganic oxide. These oxides have a high total pore volume and surface area (note column 4, lines 31-41).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use substrate with different densities and different loadings for the catalysts, in the process of Gorynin '302, as suggested by Ernest '441 because such practice is conventional for treating exhaust gas from an internal combustion engine.

Claims 2, 6-11, 20-21, 36-39, 46 rejected under 35 U.S.C. 103(a) as being unpatentable over Ernest '441 in view of Ishida '281.

Ernest '441 is applied as stated above to teach a method for treating exhaust gas from an internal combustion engine (note claim 1). When used in the treatment of internal combustion engine exhaust gases, the catalyst material is preferably also effective for the conversion of hydrocarbons, carbon monoxide and/or nitrogen oxide pollutants (note column 3, lines 56-59).

The difference is Ernest '441 does not disclose an anchor layer.

Ishida '281 discloses a process for producing a catalyst unit for NO_x reduction of exhaust gas, wherein molten metal is sprayed upon surfaces of a metal plate allowing the molten metal to accumulate thereon to form rough surfaces and rough surfaces thus obtained are deposited with a catalytic substance for NO_x reduction of exhaust gas. Forming the surfaces of the metal plate into rough surfaces is effected by molten metal spraying. In typical case, a metal wire is heated to be molten by contact resistance of electricity, an electric arc or high temperature flames, and molten metal thus obtained

are sprayed together with gas such as compressed air through nozzles on the surfaces of the metal plate (note paragraph bridging columns 4-5).

It would have been obvious to one of ordinary skill in the art at the time invention was made to include an anchor layer deposited by electric arc method, as suggested by Ishida '281, in catalyst used in Ernest '441 because such anchor layer would prevent the catalytic substance from falling off, i.e. promote bonding between the substrate and the catalytic substance.

Claims 3-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ernest '441 and Ishida '281 as applied to claims 2, 6-11, 20-21, 36-39, 46 above, and further in view of Donomoto et al (4,798,770) or Draghi et al (6,042,879).

The difference not yet discussed is Ishida '281 does not disclose that the anchor layer comprises nickel and aluminum.

However, Ishida '281 teaches that the molten metal sprayed is preferred to be the same type of material as the metal plate (note column 5, lines 9-10) and the metal plate is desired to be heat resistance and corrosion resistance (note column 4, lines 53-61) such as stainless steel. However, the teaching of Ishida '281 should not be limited to just the exemplified metals.

Donomoto '770 discloses that alloys include Ni-Cr alloys, Ni-Al alloys containing 3-20% Al, Ni-Cr-Al alloys, Ni-Cr-Al-Y alloys are heat and corrosion resistant (note column 5, lines 51-63).

Alternatively, Draghi '879 teaches that MCrAlY, where M is nickel and/or cobalt, has corrosion and heat resistant properties (note column 4, lines 7-14). It would have been obvious to one skilled in the art to optimize the composition of the MCrAlY alloy to obtain the desired corrosion and heat resistant properties.

It would have been obvious to use any known metal which is heat and corrosion resistance, such as the MCrAlY alloys suggested by Donomoto '770 or Draghi '879 for the catalyst of Ishida '281 because heat and corrosion metal is desired in Ishida '281.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. JP 08-319,824 (EP 831,211 can be used as an unofficial English translation) is cited to show that it is known to use corrugated porous substrate in a catalyst for treating exhaust from an internal combustion engine, such as in a motorcycle engine.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ngoc-Yen M. Nguyen whose telephone number is (571) 272-1356. The examiner is currently on a Part time schedule.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on (571) 272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Ngoc-Yen Nguyen

Ngoc-Yen M. Nguyen
Primary Examiner
Art Unit 1754

nmn
May 29, 2007